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San Diego, California 92152-7250 AP-98-1 June 1998

Bibliography of Reports and Journal Articles Approved for Public Release: FY97

NPRDC-AP-98-1

June 1998

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13. ABSTRACT *(Maximum 200 words)*

This report lists all technical reports, technical notes, administrative publications, journal articles, and book chapters that were approved for public release in FY97. Publications in each category are listed in chronological order under the following areas: Workforce Management, Personnel and Organizational Assessment, Classroom and Afloat Training, and Administrative Publications.

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Foreword

The Navy Personnel Research and Development Center (NPRDC) is an applied research center, contributing to the personnel readiness of the Navy and Marine Corps. The Center develops better ways to attract and select the most qualified people for naval service, to assign them where they are most needed, to train each one effectively and efficiently, and to manage personnel resources optimally. By combining a deep understanding of operational requirements with first-rate scientific and technical abilities, the Center is unique in being able to develop new, useful knowledge while refining technology to address people-related issues. This dual expertise permits the Center to develop a technology base for improving the use of human resources within Navy systems and to apply state-of-the-art technology to solve emerging problems.

The research and development (R&D) methods used by NPRDC are derived from behavioral, cognitive, economic, and social sciences as well as from applied mathematics, statistics, and computer science. The application of these methods results in tangible products of use to the Navy and Marine Corps. NPRDC constantly searches for technological opportunities to improve personnel readiness and to reduce manpower costs. The Center is accountable to the Chief of Naval Personnel, its sponsors, and its customers for high productivity, strict ethics, honesty, integrity, professionalism, and perspective.

NPRDC seeks to do as much of its work as possible in the operational settings where final products are intended to be used. This approach ensures that the needs of customers are met and that the customers themselves become familiar with the operational capabilities of the particular products.

This bibliography contains an abstract of each technical report, technical note, and administrative publication published and approved for public release in FY97.

A list of journal articles is also provided. Published reports are listed by appropriate subject categories for reference convenience. The scope of each category is defined below.

Workforce Management develops new computer-based systems and methods for allocating manpower resources, developing personnel inventories, and distributing or assigning those personnel to improve military readiness and control costs.

Personnel and Organizational Assessment develops and evaluates systems for recruiting, selecting, classifying, and utilizing military personnel to improve performance. Serves as the lead Department of Defense R&D laboratory for the development of a Computerized Adaptive Testing version of the Armed Services Vocational Aptitude Battery (CAT-ASVAB).

Classroom and Afloat Training develops new educational and training technologies to reduce formal Navy training costs and to improve Navy training effectiveness.

Center Support includes formal reports on significant matters relating to the technical program, management, or administration of the Center and informational, orientation, and recruiting brochures.

Qualified users may request copies of publications from the Defense Technical Information Center (DTIC), 8725 John J. Kingman Road, Suite 0944, Ft. Belvoir, VA 22060-6218 (Telephone: Commercial [703] 767-8019 or Defense Switched Network 427-8032). General public may order from the National Technical Information Service (NTIS), Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161 (Telephone: Commercial [703] 487-4650). When placing report orders, it is helpful to provide NTIS with the AD number.

W. M. KEENEY
Commander, U.S. Navy
Commanding Officer

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Technical Director

Bibliography of Reports and Journal Articles Approved for Public Release: FY97

Workforce Management

Technical Reports

NPRDC-TR-97-1
(AD-A317 255)
October 1996

Michael K. Nakada
Patrick C. Mackin
Christopher D. Mackie

Nuclear Officer Retention: MSR and Beyond

To combat low retention in the nuclear officer community, the Nuclear Officer Inceptive Pay (NOIP) program was designed. A 1981 study of nuclear submarine officer retention found a significant, positive effect of NOIP on their retention at the end of the minimum service requirement (MSR). In 1996, the study was broadened to include nuclear-trained surface warfare officers. Again, a significant, positive effect of NOIP on the MSR retention rate was found.

This report documents the results of an investigation of historical nuclear officer retention behavior at the MSR decision point and nine decision points later. It specifies an ACOL-2 model and quantifies the impact of the NOIP retention bonus program on 10 retention decisions.

Separate models of retention were estimated for the submarine surface nuclear officer communities. For both communities, the retention elasticities with respect to the NOIP retention bonus program were small, but significant indicating that "pay does matter."

These models can be used to assess the retention and cost impacts of alternative NOIP retention strategies.

Workforce Management

Technical Reports

NPRDC-TR-97-2
(AD-A326 352)
May 1997

Jules I. Borack

A Technique for Estimating the Impact of Improvements in Drug Testing Sensitivity on Detection and Deterrence of Illicit Drug Use by Navy Personnel

A model was developed for estimating the impact of improvements in drug testing sensitivity on both detecting and deterring illicit drug users. The model represents an improvement over existing detection and deterrence models by incorporating test rate and sensitivity parameters into estimation of the deterrence effect. The monthly test rate, sensitivity of the test to previous drug use, frequency of drug use, and other factors all impact the probability of detecting and deterring drug users. Improvements in drug test sensitivity were shown to have a dramatic impact on both detection and deterrence of illicit drug users.

Workforce Management

Technical Note

NPRDC-TN-97-9
(AD-A326 996)
June 1997

Gary A. Ropp

COURTNEY User's Guide

The instructions for use of **COURTNEY** sea/shore rotation model. This model projects assignment distribution for personnel inventories of Navy enlisted management communities.

Workforce Management

Journal Article

Borack, J. I. (1997). A technique for estimating the probability of detecting a nongaming drug user. *The American Statistician, 51(2)* 134-136.

To evaluate the effectiveness of random urinalysis drug testing strategies, it is necessary to estimate the probability of detecting drug users, that is, the probability that users will be selected for drug testing and test positive. Methodologies were developed for estimating the probability of detecting nongaming drug users under a variety of drug wear-off models. It was observed that the probability of detection is proportional and the expected number of months until detection is inversely proportional to the monthly test rate.

Personnel and Organizational Assessment

Technical Notes

NPRDC-TN-97-3
(AD-A319 602)
December 1996

Patricia J. Thomas

Analysis of Unplanned Losses From Deploying Ships

This study was conducted to investigate the number of pregnancy losses that are incurred by ships in the 6-month period prior to deployment. Additionally, the reasons why some enlisted crew members do not deploy with their ships were determined. Data were extracted from all available Enlisted Manning Inquiry Reports and final Personnel Manning Assistance Reports from deploying gender-integrated surface ships in the Atlantic and Pacific fleets. Since these data are retained for less than 2 years, the sample was limited to 24 ships. Analyses consisted solely of frequencies and percentages.

Medical problems and administrative discharges were the most frequent causes of unplanned losses from deploying ships. While pregnancy accounted for 20 percent of the losses, commands were less likely to request a replacement for the woman than when the vacancy occurred for some other reason. Only 8 percent of the non-deploying personnel were pregnant. Seventy-three percent of the personnel who were left behind did not deploy because of disciplinary and medical reasons.

Because of the documents reviewed for this study are only available as paper copies, and are submitted by all Navy activities (except submarines), it is recommended that an automated system be established.

NPRDC-TN-97-4
(AD-A322 477)
January 1997

Herbert George Baker
Michael Ford

Navy-wide Personnel Survey (NPS) 1995: Opinions, Issues, and Satisfaction

The 1995 Navy-wide Personnel Survey was completed by 4,562 enlisted personnel and 2,883 officers on topics related to detailing and the assignment process, quality of life, organizational climate, and health issues. Each of the topics was measured by several questions that were formed into opinion gauges ("scales") based on reliability analyses. Results for these gauges are presented separately for enlisted personnel and officers.

Technical Notes

Gauges are broken down by demographics and correlated with measures of retention plans.

NPRDC-TN-97-5
(AD-A331 540)
February 1997

John Kantor
Michael Ford
Murrey Olmstead

Navy-wide Personnel Survey (NPS) 1996: Statistical Tables for Officers

The seventh annual Navy-wide Personnel Survey (NPS) was mailed in August 1996 to a random sample of 15,213 active duty enlisted personnel and officers. Completed questionnaires were accepted through mid-November 1996. The adjusted return rate was 45 percent. Survey topics included detailing and the assignment process, quality of life programs, organizational climate, and health issues. Responses were weighted by paygrade to allow generalization of sample results to the Navy population. Responses of enlisted personnel are broken out by paygrade and other important demographic variables.

NPRDC-TN-97-6
(AD-A331 539)
February 1997

John Kantor
Michael Ford
Murrey Olmstead

Navy-wide Personnel Survey (NPS) 1996: Statistical Tables for Enlisted Personnel

The seventh annual Navy-wide Personnel Survey (NPS) was mailed in August 1996 to a random sample of 15,213 active duty enlisted personnel and officers. Completed questionnaires were accepted through mid-November 1996. The adjusted return rate was 45 percent. Survey topics included detailing and the assignment process, quality of life programs, organizational climate, and health issues. Responses were weighted by paygrade to allow generalization of sample results to the Navy population. Responses of enlisted personnel are broken out by paygrade and other important demographic variables.

Personnel and Organizational Assessment

Technical Notes

NPRDC-TN-97-7
(AD-A324 586)
April 1997

Hal H. Rosen
John P. Sheposh
Joyce Shettel-Dutcher
Annie S. Barnes
Jill M. Ralston
Steve Tally

Violence Prevention and Control Programs in the Navy: A Review of Programs, Program Effectiveness, and Factors Affecting Program Success

The prevalence of violence in everyday life is of universal concern. Terrorism, domestic violence, child abuse, and gang violence exemplify the types of violence that make people feel more vulnerable and cause them to feel that they exist in an increasingly violence-prone society.

This concern of the prevalence of violence in every day life is not limited to the civilian population. The U.S. military is increasingly concerned with the amount of violence that affects members in non-combat situations and that invades their family life.

The present study was proposed to provide a better understanding of the many programs that are in use designed to deal with violence and their effectiveness. At present the large number and variety of programs operating at different levels have not been coordinated nor comparatively assessed, which prevents the employment of a coherent, coordinated strategy for controlling violence in the Navy. The objectives of this study were (1) to identify and categorize the various violence control and prevention approaches and interventions that are currently used in the Navy, (2) to determine the nature of measurements used to assess effectiveness of these programs, and (3) to identify organizational and contextual factors which facilitate or inhibit attempts to reduce or eliminate violence.

NPRDC-TN-97-8
(AD-A326 152)
May 1997

Herbert George Baker
Michael Ford

The 1995 Navy Core Values Survey: Further Progress Toward a Navy Values Community

This report contains the results of three administrations of the Navy Core Values Survey. Trends in response patterns are identified, and recommendations are made for further research.

Personnel and Organizational Assessment

Technical Notes

NPRDC-TN-97-12
(AD-A329 867)
September 1997

J. P. Craiger
R. J. Weiss
A. B. Butler
D. Goodman
Gerry L. Wilcove

Navy Quality of Life Survey: Structural Equation Modeling

During a period of downsizing and fiscal cutbacks, quality of life (QOL) and retention may suffer. To assess QOL in the Navy, 17,000 surveys were mailed to enlisted personnel and officers. A total of 7,100 were completed and returned, a response rate of 47 percent. Two models, previously developed and validated, were replicated using structural equation modeling. The first model related life domains, such as work, career development, relationship with partner, and pay, with overall perceptions of QOL in the Navy. The second model related organizational outcomes, such as intention to remain in the Navy, with three global/aggregated perceptual indices: conflict between being in the Navy and one's personal life, Navy life compared with civilian life, and the extent to which Navy experiences matched expectations. Computer software was developed for the first model so that Navy managers could predict the impact of life domain experiences on perceived QOL.

Personnel and Organizational Assessment

Journal Article

Larson, G. E. (1996). Mental rotation of static and dynamic figures. *Perception and Psychophysics, 58,* 153-159.

Previous studies comparing performance on standard (i.e., static) and dynamic spatial test items have concluded that the two item types measure different abilities. Such conclusions about the uniqueness of static and dynamic spatial abilities seem premature, however, since only a limited number of dynamic spatial tasks have been utilized in research and these have differed markedly from their static counterparts. In the present studies, tasks were designed to require a common mental operation (mental rotation) under static and dynamic conditions. Correlations between static and dynamic performance ranged from .80 to .90. This appears to suggest that the emergence of a unique dynamic ability factor depends on the utilization of certain specialized tasks (e.g., arrival time tasks) with mental operations much different than those required by conventional spatial tests. In other words, it is apparently the requirement for different cognitive processes and not the processing of stimulus motion per se that distinguishes performance on *some* dynamic tasks from performance on *some* standard static tasks.

Linville, S. E., Elliot, F. C., & Larson, G. E. (1996). Even-related potentials as indices of subclinical neurological differences in HIV patients during rapid decision making. *Journal of Neuropsychiatry and Clinical Neurosciences, 8,* 293-304).

The authors examined decision making in HIV patients under slow and rapid information deliveries. Thirteen asymptomatic, HIV-infected (HIV+) subjects with known seroconversion dates and 13 healthy control subjects were instructed to detect the "oddball" target tones among nontarget tones during single-channel (slow) and dual-channel (rapid) deliveries. Event-related potentials (ERPs) from midline scalp sites, reaction time, and "hits"

Journal Article

were recorded. Behaviorally, the two groups performed similarly, and during single-channel delivery they produced similar ERPs indexing target detection. However, during dual-channel delivery the HIV+ group showed atypical morphology in the region of the P300 cognitive decision-making component compared with the control group. Auditory ERPs elicited by rapid, dichotic stimulus presentations appeared sensitive to subclinical effects of HIV-related neuropathology in individuals who had been HIV-positive for three months to eight years.

MacMillan, J., Getty, D. J., & Tatum, B. C. (1997) Visual metaphors and mental models in display design: A method for comparing intangibles. *Proceedings of the Human Factors and Ergonomics Society 41st Annual Meeting* (p. 284).

Visual metaphors are often used in designing human-computer interfaces for complex systems. In order to be useful, such metaphors must be congruent with users' underlying mental models of system organization or system function. When metaphors fail to be useful in interface design, it is difficult to know whether a better metaphor would improve performance or whether the use of a visual metaphor is, in general, inappropriate for the application. A method is needed to assess the congruence between users' conceptual models of a complex process and the visual metaphor used to represent that process, independent of users' conceptual models of a complex process and the visual metaphor used to represent that process, independent of users' performance with the interface. The authors developed and applied such a method as part of an evaluation of a user coach for a manpower planning application. The results indicate a high degree of congruence between the visual metaphor implemented in the interface and the conceptual features of the manpower planning process.

Personnel and Organizational Assessment

Journal Article

Saccuzzo, D. P., Craig, A. S., Johnson, N. E., & Larson, G. E. (1996). Gender differences in dynamic spatial abilities. *Personality and Individual Differences, 21,* 599-607

Gender differences in spatial ability were evaluated for two computerized dynamic (one power and one speed) and two static paper and pencil (one power and one speed) tests over sessions. Four factors were evaluated in a factorial design: gender, practice (i.e., session), paper and pencil vs. Dynamic (i.e., computerized) spatial tests, and power vs. Speed. A total of 250 paid volunteer men and women were tested in a counterbalanced design over two sessions. Results revealed two significant ($p < 0.05$) triple interactions involving gender, session, and power vs. Speed as well as dynamic vs. Paper and pencil tests. Although men generally did better than women and all subjects improved with practice, women improved at a faster rate for the speeded computer task and were not statistically different from the men at session 2. Future research should be directed toward two main thrusts: the effects of practice on the power tests and the effect of practice on the predictive validity of the speeded computerized tests.

Yanwen, W., Folchi, J., Blanco, T. A., Lath, S., & Burns, L. (1997). Exploiting airline reservation technologies to improve Navy training management.[1] *Journal of International Transactions in Operational Research.*

The Navy trains hundreds of thousands of students every year. For Navy training, yield management means offering the right school seats to the right customers (e.g., active duty, reservists, foreign nationals) at the right time to maximize fleet readiness. The yield management methods will permit the Navy to make the best use of its

[1]The viewpoint and conclusion expressed in this paper are those of the authors, are not official, and do not necessarily reflect views of the Department of the Navy.

limited training resources. This paper discusses the yield management technologies that will be tightly integrated into the Navy's new on-line training seat reservation system.

Classroom and Afloat Training

Technical Report

NPRDC-TR-97-3
(AD-A328 827)
August 1997

John A. Ellis
Barbara Tarker
Steven E. Devlin
Sandra K. Wetzel-Smith

The Interactive Multisensor Analysis Training (IMAT) System: An Evaluation of Acoustic Analysis Training in the Aviation Antisubmarine Warfare Operator (AW) Class "A" School

The Interactive Multisensor Analysis Training (IMAT) System was developed to address post Cold War ASW training requirements. It is designed to teach the complex conceptual knowledge and cognitive and procedural skills required to reason about the interrelationships among the operating modes of target submarines, the environmental variables that affect sound transmission, and the sensor systems used for detection and tracking. This effort evaluated the application of the IMAT system in the Aviation Antisubmarine Warfare Operator (AW) Class "A" School. The results showed that (1) research on cognition and instruction and technological advances in scientific visualization can be integrated and applied in real world training to produce substantial gains in performance and student motivation, (2) the IMAT system has achieved its intended design goals by effectively teaching complex knowledge and cognitive skills, and (3) the IMAT system emphasis on inclusion of required instructional components contributed significantly to the observed performance improvements.

Classroom and Afloat Training

Technical Notes

NPRDC-TN-97-1
(AD-A315 858)
October 1996

Thomas M. Duffy
Carol A. Robinson

Designing Tools to Aid Technical Editors: A Needs Analysis

The goal of this research was to identify the needs of technical editors that could be supported through the development of computer tools. Additionally, our goal was to understand the technical editing context as it is relevant to the design of those tools. Expert technical editors were surveyed to study three issues relevant to the design of computer-aided tools: the editing context, editing tasks and problems, and opportunities for designing computer-based tools. Potential design capabilities were identified. These include a networked document management system along with a "comment" capability that supported accurate text analysis support tools.

NPRDC-TN-97-2
(AD-A316 949)
October 1996

James C. Chung
David L. Ryan-Jones
Eleanor R. N. Robinson

Graphical Systems for Explosive Ordnance Disposal Training

A prototype computer-based training (CBT) system was developed to investigate the effectiveness of applying interactive, 3-D graphics techniques to teach Render Safe Procedures (RSPs) for Explosive Ordnance Disposal (EOD). The EOD Graphical Training (EOD-GT) prototype combines conventional multimedia computer based instruction with interactive manipulation of the ordnance in a 3-dimensional graphical environment to provide the student with opportunities to engage the ordnance and hands-on practice of RSP procedures. The prototype EOD-GT focuses on the SUU-25 airborne dispenser and was installed at the U.S. Navy EOD School for evaluation. Development of the system and future directions are discussed in this report.

Classroom and Afloat Training

Technical Notes

NPRDC-TN-97-10
(AD-A328 001)
July 1997

Robert F. Helms, II
Daniel B. Nissman
James F. Kennedy
David L. Ryan-Jones

Virtual Environment Technology for MOUT Training

Military operations in urban terrain (MOUT) is an important component of land combat due to increasing urbanization throughout the world.

The objectives of this study were to (1) evaluate the use of virtual environment (VE) technology for training military personnel on MOUT tasks, (2) identify the behavioral issues associated with use of VE technology for training, and (3) identify previous attempts to stimulate individual behavior in a VE. MOUT were analyzed to determine the applicability of VE technology for training both individual and team-level tasks associated with MOUT. The analysis considered candidate technologies, costs, trade-offs, alternatives, and expected changes in technologies over the next 6 years. The analysis focused on MOUT training tasks that were previously described in U.S. Army and U.S. Marine Corps training manuals, and in previous task analyses performed by other research and development organizations.

NPRDC-TN-97-11
(AD-A329 015)
August 1997

David L. Ryan-Jones
Cheryl J. Hamel

Guidelines for Use of Three-Dimensional (3-D) Graphics to Enhance Training of Explosive Ordnance Disposal (EOD) Render-Safe Procedures

This report focuses on how 3-D graphical and interactive features of computer-based instruction can enhance learning and support human cognition during technical training of equipment procedures (where procedural training tasks are often highly specific to a piece of equipment). Studies of the effects of graphics, motion, and interactivity in technical training, and reports of successful instruction using state-of-the-art graphics and animation were reviewed to extract a set of guidelines for using 3-D interactive graphics to teach equipment procedures. The guidelines are directly applicable to the design of training of explosive ordnance disposal (EOD) render-safe procedures.

Journal Article

Ellis, J. A., Whitehill, B. V., & Irick, C. The effects of explanations and pictures on learning, retention, and transfer of a procedural assembly task. (1996). *Contemporary Educational Psychology, 21*, 129-148.

Two experiments investigated the effects of qualitative explanations and pictures on learning, retention, and transfer of a procedural assembly task. Results showed that (1) functional explanations are more effective than structural explanations in learning and remembering an assembly task; however, their effects are diminished when learning subsequent similar tasks, (2) providing pictures facilitates learning but does not help performance once the task has been learned to criterion, and (3) previous experience in a task domain results in positive transfer to new tasks in the same domain.

Center Support

Administrative Publications

NPRDC-AP-97-1
(AD-A319 684)
December 1996

Bibliography of Reports and Journal Articles Approved for Public Release: FY96

This report lists all technical reports, technical notes, administrative publications, journal articles, and book chapters that were approved for public release in FY97. Publications in each category are listed in chronological order under the following areas: Workforce Management, Personnel and Organizational Assessment, Classroom and Afloat Training, and Administrative Publications.

NPRDC-AP-97-2
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Command History Calendar Year 1996

This report reflects the Navy Personnel Research and Development Center's 1996 operating philosophy, Commanding Officer and Technical Director biographies, history, organization, center resources, research and development program, Technical Director awards, and publications.

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